Ghana:
A Case Study in Macroeconomic Adjustment

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Abstract

Ghana's macroeconomic misalignment in the 1970s and 1980s necessitated structural adjustment. Using a mulit-sectoral partial equilibrium model, we identify price incentives in the major export sectors, real exchange rate re-alignment, increased foreign capital inflows, higher interest rates, lower inflation and domestic savings as major areas for government policy consideration.

Introduction

Ghana is currently in its eighth year of economic reforms. It remains at the forefront of economic adjustment in Sub-Sahara Africa. Thus, its sectoral and macroeconomic performance is of poignant interest.

The major premise of this study is that the poor economic policies biased toward the non-productive and inefficient public sector contributed to the Ghanaian macroeconomic misalignment. The profitability and productivity of the cocoa and industrial tradeables were subject to substantial negative taxation in the economy between 1975 and 1987. These negative incentives may have been brought about by pressures from the real exchange rate appreciation, induced by the decrease in the terms of trade and the growing fiscal expenditure and deficit. Other pressures included the lack of capital inflow which is explained by the weak interest rate parity movements.

Ghana's economic position, immediately following her independence in 1957 and through 1970, was one that showed immense promise. However, through the decade of the 1970s and early 1980s, a combination of poor economic policies, drought and oil price increase caused the gross domestic product (GDP) to decline from an average growth rate of 3.4 percent to -0.3 percent.

Throughout the 1970s and 1980s, agriculture stagnated in growth, industry minimally reversed its negative growth, while the service sector picked up some momentum. By the middle of 1987, per capita income (GNP) had fallen to US$ 390 and the country's basic needs indicators (once the best in Africa), followed the palpable trend of other Sub-Sahara African countries.

The 1970s in particular witnessed immense economic mismanagement. Large budget deficits emanating from the large, inefficient public sector, accelerated domestic inflation. Inflation manifested itself in consumer prices, wholesale prices, the implicit GDP deflator and implicit expenditures.

Gross national income per capita and private consumption continue their secular decline. The government's unwillingness to adjust nominal exchange rates led to a high level of real rate appreciation that introduced shocks in the form of price disincentives to the export commodities (especially cocoa). There was a major shift, therefore, toward imports. Indeed, the import-to-GDP elasticity rose from -2.3 (1965-73) to 13.6 (1973-80).

A well articulated loss of confidence by external donors in the Ghanaian economy exarcebated the foreign exchange crisis. Export decline and a loss in export tax to the public sector followed, which highly constrained government capital expenditure.

The Economic Recovery Program and Structural Adjustment

In response to the general macroeconomic misalignment of the 1970s, the government of Ghana launched one of the most comprehensive sets of economic reforms in April 1983 called the Economic Reform Program (ERP). The major purpose was to reverse the economy's steady deterioration since 1970. It sought, among other things, to realign relative prices in favor of production (especially for exports) and away from trading and rent-seeking activities. In addition, it aimed at improving government finances by restoring fiscal and monetary discipline, to encourage private investment and to commence the rehabilitation of the country's

productive base and economic and social infrastructure. The initial program was launched under the aegis of the International Monetary Fund (IMF), the World Bank and the International Development Agency (IDA).

The national currency, the cedi, was devalued to reflect the market rate. On February 20, 1987, the official and auction exchange rates were unified at about 150 cedis to the dollar.

The Structural Adjustment Program (SAP) took over in 1987 where the ERP left off. The core of this program was reforms in trade and exchange rates, the cocoa sector, financial systems fine-tuning, civil service employment freeze and public expenditure policy toward prioritized pay-off investments.

The cocoa sector has traditionally been the key to Ghana's economy, as a source of export and tax revenues and also employment and income in the rural areas. But cocoa farmers have suffered through price disparities that tax their crops. This has been attributed, in part, to the excessive marketing costs of the government's parastatal, the Ghana Cocoa Board (Cocobod). Cocoa marketing efficiency, staff retrenchment and privatization have begun. The government is also monitoring the performance of other State Owned Enterprises (SOEs) to ensure accountability and to encourage private sector competition and free-market discipline.

Analytical Model

To analyze Ghana's economic policy linkages, we study the performance of the goods, money and financial markets. We also investigate the effects of trade and

exchange rate policy incentives in terms of the incidence of taxation on agricultural cash crops and industry (the major foreign exchange earners).

The Goods Market

We disaggregate the agricultural tradeables in major cash crops (cocoa,C) and other agriculture and livestock (CT). The nonagricultural tradeables (NA) include the various categories of industry (mining, manufacturing, etc.). The nontradeables (NT) include services (transport, wholesale and retail trade, insurance, etc.).

Relative prices of relevance are $P_{CT} = P_{ct}/P_{nt}$, $P_C = P_c/P_{nt}$ and $P_{NA} = P_{na}/P_{nt}$, where P_{nt} is the price deflator for services, P_c is that for cocoa, P_{na} is that for industry and P_{ct} is that for other agriculture and livestock. We estimate the following supply equations (following Garcia and Llamas,1988) using national accounts in equilibrium, and a time trend variable as a proxy for technological change. Following Kennen (1985), we use fixed wages by imposing Ricardian assumptions (fixed output and complete specialization).

$$NT^s = NT^s (P_{CT}, P_C, P_{NA}, T) \quad (1)$$

$$C^s = C^s (P_{CT}, P_C, P_{NA}, T) \quad (2)$$

$$NA^s = NA^s (P_{CT}, P_C, P_{NA}, T) \quad (3)$$

$$CT^s = CT^s (P_{CT}, P_C, P_{NA}, T) \quad (4)$$

We will also use a modified form of Nerlove's (1956) partial adjustment model to test for lagged supply response (since structural rigidities in the economy may not allow for instantaneous price adjustment). An even better response for cocoa will include the acreage alloted to cocoa (XC) as a dependent variable.

The Money Market

Following Dornbusch (1980, pg. 176), a demand for money equation, to be used in determining the response to interest rate changes in a semi-open economy in the short run, is given by;

$$M^d/P = m^d = m^d (I, r, m^d_{-1}, TOT) \quad (5)$$

where M^d is the nominal money demand (M1), P is the consumer price index (CPI), r is the domestic interest rate, TOT is the ratio of aggregate export-to-import index, and m^d_{-1} is the real demand for cash balances lagged one period.

Fluctuations in the monetary reserves (dR/M) may be attributed to the effects of changes in the current and capital accounts. We isolate the real per capita GDP (GDP/POP), the value per capita of exports (PQCT/POP) and the per capita government deficit (surplus if positive, D/POP) as the determinants of the current account; and the domestic to foreign interest rate differential ($r/r^*(1 + e)$) and the difference between per capita debt and debt service (DEBTD/POP) as the major determinants of the capital account. This is consistent with Fleming (1962) and Mundell (1962, 1963).

dR/M =

dR/M (GDP/POP, $r/r^*(1 + e)$, PQCT/POP, DEBTD/POP, D/POP) (6)

The external interest rate (r^*), the rate of devaluation (e) or interest rate parity $r^*(1 + e)$ and domestic monetary policy (measured using a proxy of GDP/POP, D/POP or per capita capital depreciation, DEP/POP) have important macroeconomic policy implications on the interest rate movements. We specify an equation for the real interest rate movements to determine the linkage between changes in the

international and domestic capital markets (in terms of the parity rate) on the domestic interest rate;

$$r = r (r^*, e, GDP/POP, D/POP) \quad (7)$$

The Foreign Exchange Market

The real exchange rate movement is specified to analyze how it is influenced by certain monetary instruments. The choice of model is influenced by the monetary, as opposed to the portfolio-balance approach of the asset market. First, we define real exchange rate as a logarithmic function of the market exchange rate (LEXCH), lagged domestic interest rate, per capita GDP, relative price for cocoa and that for industry. Also, to achieve consistency with our prior terms of trade definition, we define the real exchange rate as the ratio of the aggregate export-to-nontradeable (service) sector price (LPCNA). In addition, we include the government expenditure-to-GDP ratio (EXP/GDP);

$$LEXCH = LEXCH (r, GDP/POP, P_C, P_{NA}, D/POP)_{-1} \quad (8)$$

or

$$LPCNA = LPCNA (r, GDP/POP, P_C, P_{NA}, EXP/GDP)_{-1} \quad (9)$$

where all variables in equations (8) and (9) are in logarithms except for the interest rate.

Trade and Exchange Policy Effects on Cocoa and Industry

We use a general equilibrium framework similar to Garcia (1981), Oyejide (1986) and Tsibaka (1986) in arriving at a set of equations that allow us to measure

the incidence of government's trade and exchange rate policy taxation on cocoa and industry. The underlying static equilibrium approach follows Dornbusch (1974) and Sjaastad (1980) in that it demonstrates that exchange rate policies sometimes have global economic repercussions quite different from those intended by policymakers. Indeed, Balassa (1981), Little *et al* (1970) and Krueger *et al* (1981) have studied how incentive systems and resource flows in developing countries have concentrated on the degree of protection for competing manufacturing activities by trade and exchange rate policies. The incidence equations for cocoa and industry respectively are;

$$\ln (P_{nt}/P_c) = \ln [P_{nt}/P_c (P_{ct}/P_c, GDP/POP, BOT)] \quad (10)$$

and

$$\ln (P_{nt}/P_{na}) = \ln [P_{nt}/P_{na} (P_{ct}/P_{na}, GDP/POP, BOT)]. \quad (11)$$

Results

Based on the eleven equations, the econometric model was estimated using ordinary least squares. Annual data from the *World Bank, Food and Agricultural Organization sources,* and the IMF *International Financial Statistics* from 1975 through 1987 were used. The empirical estimates of the parameters of the structural equations are reported in Table 1. The t-values are presented in parentheses below their respective coefficients.

Estimation of the supply response equations for the real sector proved problematic in that it was difficult to obtain expected signs and significance of the price coefficients. However, by using a modification of Nerlove's adaptive expectation model, more consistent results were obtained. The own prices were

not only positive as hypothesized, but they were more significant. Generally, we observe very high supply response to the previous year's prices in all real sectors. For the major cash crop (cocoa), the elasticity of acreage response expectation to the previous year's cocoa price is 3.49 which conforms to the nonzero results of Griliches (1959). Thus, Ghanaian farmers respond rationally to price incentives. While the cocoa and industrial sectors exhibited negative trend variability, the service and other agricultural sectors were positive.

For the demand for money equation, the estimated coefficients were all consistent with expectation. The marginal propensity to spend out of increased income is 0.04 which is much smaller than that obtained by Alexander (1952) for the U.S. A probable explanation is that induced investment is either too small or nonexistent as a component.

In the interest rate equation the estimated coefficients of per capita GDP, deficit, foreign interest rate and the rate of devaluation are all as expected. An alternative estimation that includes per capita capital depreciation and the interest parity rate also conformed to our expectation. Thus, even though government regulation restrict capital mobility, the domestic interest rate follows the parity rate. The level of domestic interest rate, therefore, depends on both external and internal factors and monetary policy impacts the economy.

The changes in international reserves equation provides mixed results. Though significant, the sign on the coefficient of exports failed to give the expected sign. The interest rate differential did not conform to expectation. This points to the weak international mobility of capital to Ghana during the study period. Indeed, until 1984, there was no perceptible capital inflow. However, all other variables

performed credibly, pointing also to the weak role played by real income, the debt-to-debt service differential and government deficit in the current account portion of government reserves.

In the first estimate of the exchange rate equation (LEXCH), the signs on the coefficients of per capita GDP, and the relative price of cocoa to services did not have the expected signs. However, in the second estimate that used the terms of trade between the price of the aggregated exportable sectors (cocoa and industry) to service sector, the results conformed more to expectation. An improvement in the terms of trade of cocoa and industries, real income and government expenditure to GDP (biased toward exportables) should, therefore, increase the relative price of exportables. The negative effect of interest rate on the exportables indicates that policies that increase real interest rate lead in the medium run to a reduction in the real exchange rate, all other things remaining constant.

The government's commercial policy equation yields good results for the incidence of taxation on the cocoa and industrial sectors. We observe highly significant levels of taxation of 93 percent on the cocoa sector and 62 percent on the industrial sector of government trade and macroeconomic policy impacts. These are similar to previous results obtained for Nigeria (Oyejide, 1986) and for Columbia (Garcia, 1981). The results also confirm the lack of incentives in the two major sectors of the Ghanaian economy that contributed to the macroeconomic demise.

Conclusion

We demonstrated that farmers exhibit rational response to cocoa prices. Hence, the core of the ERP and SAP that provide price incentives to farmers should

not only rejuvenate the cocoa sector, but also help provide the raw materials needed to feed into the industrial sector.

Real exchange rate appreciation, caused by export price deterioration and negative interest rates created terms of trade disparities. Monetary policy does impact the economy, even though the international mobility of capital to Ghana has been weak. Foreign capital investment is imperative in the SAP if the economy should experience any sustainable stability and growth vis-a-vis the external payments viability in the medium to long run. However, the public's (including external investors') willingness to hold financial assets in Ghana would increase in tandem with higher interest rates and lower inflation. Lastly, increased wage incomes from all sectors should influence the Ghanaian ability to save and, therefore, invest in productive activities (especially since the export sectors face volatile international markets).

Table 1. Results of the Structural Estimates.

Supply Response: Comparative Statistics

	Constant	P_{CT}	P_C	P_{NA}	T
C^s	474.46	41.46	-120.64	247.15	-24.46
	(3.52)	(0.59)	(1.30)	(2.02)	(4.00)
		R^2 = 0.72		D.W. = 1.88	
NT^s	1109.30	132.29	95.51	236.48	44.13
	(6.75)	(1.55)	(0.85)	(1.59)	(5.92)
		R^2 = 0.91		D.W. = 2.07	
NA^s	601.92	146.13	-56.42	461.48	-47.14
	(4.55)	(2.12)	(0.62)	(3.86)	(7.86)
		R^2 = 0.92		D.W. = 1.65	
CT^s	2106.20	-253.58	293.22	-519.45	46.20
	(6.12)	(1.41)	(1.24)	(1.67)	(2.96)
		R^2 = 0.66		D.W. = 0.96	

Supply Response: Adaptive Expectations

	Constant	P_{CT-1}	P_{C-1}	P_{NA-1}	C^s_{-1}	XC_{-1}	T
C^s	474.46	-102.66	60.71	150.47	0.09	----	-27.44
	(3.52)	(3.23)	(1.18)	(2.13)	(0.78)	----	(7.61)
		R^2 = 0.95		D.W. = 2.54			
NT^s	1459.10	-39.55	-60.77	307.64	----	----	36.79
	(13.01)	(0.50)	(0.37)	(1.65)	----	----	(3.42)
		R^2 = 0.81		D.W. = 1.78			
NA^s	1068.90	-115.80	14.49	352.80	----	----	-53.99
	(13.14)	(2.03)	(0.12)	(2.60)	----	----	(6.92)
		R^2 = 0.87		D.W. = 1.87			
CT^s	1418.10	171.01	331.55	-515.19	----	----	59.77
	(9.74)	(1.68)	(1.55)	(2.12)	----	----	(4.28)
		R^2 = 0.93		D.W. = 1.39			
XC	101.40	-2.60	3.49	14.44	----	-0.20	-1.66
	(23.55)	(0.70)	(0.59)	(1.87)	----	(2.27)	(4.42)
		R^2 = 0.83		D.W. = 1.96			

Demand for Money

	Constant	I	r	m^d_{-1}	TOT
M^d/P	-70.42	0.04	-6.99	0.008	32.20
	(0.64)	(1.59)	(4.66)	(0.05)	(1.35)
		R^2 =0.79		D.W. = 2.10	

Table 1 continued.

Interest Rate

	Constant	r*	e	GDP/POP	D/POP	r*(1 + e)	DEP/POP
r	2.12	0.57	0.12	0.004	-0.008	----	----
	(0.17)	(2.27)	(3.95)	(0.17)	(1.45)		
		R^2 = 0.81		D.W. = 3.02			
r	29.05	----	----	0.01	-0.002	0.008	-0.86
	(1.87)	(0.61)	(0.36)	(1.30)	(2.31)		
		R^2 = 0.80		D.W. = 2.55			

Changes in International Reserves

	Constant	GDP/POP	r/r*(1 + e)	PQCT/POP	DEBTD/POP	D/POP
dR/M	0.59	-0.001	-0.07	-0.001	0.0007	0.001
	(1.45)	(1.14)	(0.31)	(3.13)	(3.92)	(0.57)
		R^2 = 0.89		D.W. = 2.18		

Exchange Rate

	Constant	r_{-1}	lnGDP/POP$_{-1}$	lnD/GDP$_{-1}$	lnP$_{C-1}$	lnP$_{NA-1}$	lnEXP/GDP$_{-1}$
LEXCH	0.26	3.01	-1.01	-0.84	-0.24	2.27	---
	(0.20)	(2.44)	(1.97)	(0.75)	(0.31)	(1.10)	
		R^2 = 0.70		D.W. = 1.39			
LPCNA	0.0007	-1.26	0.47	----	0.19	0.31	0.46
	(0.0002)	(2.14)	(1.95)	(0.86)	(0.53)	(2.38)	
		R^2 = 0.68		D.W. = 2.05			

Commercial Policy Impacts

	Constant	lnP$_{ct}$/P$_{nt}$	lnGDP/POP	BOT	lnP$_{ct}$/P$_{na}$
P$_{nt}$/P$_{c}$	5.94	0.93	-1.00	0.0006	----
	(1.32)	(10.24)	(1.37)	(0.45)	
		R^2 = 0.93		D.W. = 1.52	
lnP$_{nt}$/P$_{na}$	4.47	----	0.0001	0.0001	0.62
	(1.42)	(1.44)	(1.03)	(5.29)	
		R^2 = 0.78		D.W. = 1.37	

Absolute values of t-statistics are in parentheses.

References

Alexander, S. S. "The Effects of Devaluation on a Trade Balance." *I.M.F. Staff Papers.* 2(1952):263-278.

Balassa, Bela. *The Structure of Protection in Developing Countries.* Baltimore: Johns Hopkins University Press, 1981.

Dornbusch, Rudiger. "Tariffs and Nontraded Goods." *Journal of International Economics.* (May 1974):177-185.

_____. *Open Economy Macroeconomics.* New York: Basic Books, Inc. 1980.

Fleming, M. "Domestic Financial Policies Under Fixed and Under Floating Exchange Rates." *I.M.F. Staff Papers.* 9(1962).

Garcia, Garcia Jorge. *The Effects of Exchange Rates and Commercial Policy on Agricultural Incentives in Columbia: 1953-1978.* Research Report 24. Washington, D.C.: International Food Policy Research Institute, 1981.

Garcia, G.J. and G. M. Llamas. *Coffee Boom, Government Expenditure, and Agricultural Prices: The Columbian Experience.* Research Report 68. Washington, D.C.: International Food Policy Research Institute, 1988.

Griliches, Z. "The Demand for Inputs in Agriculture and a Derived Supply Elasticity." *Journal of Farm Economics.* 38(1959):309-322.

Kenen, Peter, B. "Macroeconomic Theory and Policy; How the Closed Economy was Opened." In *Handbook of International Economics II*, eds., R. W. Jones and P.B. Kenen. Amsterdam: Elsevier Science Publishing Company, 1985.

Krueger, Anne O. *et al.*, eds. *Trade and Employment in Developing Countries.* Chicago: University of Chicago Press for the National Bureau of Economic Research, 1981.

Little, I. M. D., Scitovsky, Tibor, and Maurice-Scott. *Industry and Trade in Developing Countries.* Oxford: Oxford University Press, 1970.

Mundell, R. A. "The Appropriate Use of Monetary and Fiscal Policy for Internal and External Stability." *I.M.F. Staff Papers*. 9(1962):70-77.

_____. "Capital Mobility and Stabilization Policy Under Fixed and Flexible Exchange Rates." *Canadian Jour. of Economics*. 29:475-485. Reprinted in; R.E. Caves and H. Johnson, eds., *Readings in International Economics*. (Irwing: Homewood, 1968):487-499.

Nerlove, Marc. "Estimates of the Elasticities of Supply of Selected Agricultural Commodities." *Journal of Farm Economics*. 38(May 1956):496-509.

Oyejide, Ademola T. *The Effects of Trade and Exchange Rate Policies on Agriculture in Nigeria*. Research Report 55. Washington, D.C.: International Food Policy Research Institute, 1986.

Sjaaastad, Larry A. "Commercial Policy, True Tariffs and Relative Prices." In *Current Issues in Commercial Policy and Diplomacy*, eds. John Black and Brian Hindley. New York: St. Martin's Press, 1980.

Tsibaka, T. B. *The Effects of Trade and Exchange Rate Policies on Agriculture in Zaire*. Research Report 56. Washington, D.C.: International Food Policy Research Institute, 1986.